REMARKS

Examiner B. Chervinsky, is thanked for the thorough examination and search of the subject Patent Application. Claims 1-2, 4, 7, 9, 11-16, 18, 21, 23, 25-28, 31, 35-36, 38, 41-44, 46, 52, 54-55, 58, and 60-63 have been amended. Claims 10, 24, 34, 37, 45, 47-51, and 64 have been canceled.

The making FINAL of the Restriction requirement is noted. Non-elected Claims 47-51 are hereby canceled. A divisional application will be filed to Claims 47-51 once the elected Claims are allowed.

Applicant has amended the Specification in the second paragraph following the TITLE to update the status of the parent non-provisional applications.

Reconsideration of Claim 34 objected to under 37 CFR 1.75 as being a duplicate of Claim 33 is requested based on Canceled Claim 34. The cancellation of Claim 34 makes this objection moot.

Independent Claims 1, 15, 31, and 41 have been amended to directly address the issues of patentability. In addition,

Claims 2, 4, 7, 9, 11-14, 16, 18, 21, 23, 25-28, 35-36, 38, 42-44, 46, 52, 54-55, 58, and 60-63 have been amended to maintain consistency with Claims 1, 15, 31, or 41 upon which they depend. Finally, Claims 10, 24, 34, 37, 45, and 64 have been canceled as now being made redundant in light of the Amended Claims.

Reconsideration of Claims 1, 3-5, 7, 9, 31, 32, 35, 41, and 43, rejected under 35 USC 102(b) as being anticipated by Sono et al is requested based on Amended Claims 1, 7, 9, 31, 35, 41, and 43, and the following remarks.

Applicant agrees that Sono teaches a semiconductor device with an integrated heat sink. However, after carefully reviewing Sono, Applicant believes that substantial differences do exist between the teachings of Sono and those of Applicant's claimed invention as recited in now Amended independent Claims 1, 15, 31, and 41. In particular, it appears that Sono teaches a radiation fin structure 12 comprising an epoxy resin with a filler comprising both metal powder and insulator powder. More importantly, Sono teaches that the radiating fin structure 12 must maintain an insulating characteristic with a very large resistance value. In particular, Sono states in the Specification,

"The radiation fin part 12 forms an essential part of the present invention, and is characterized in that the radiation fin part 12 is made of a resin. The epoxy resin forming the radiation fin part 12 includes a filler such as a metal powder and an insulator powder. For example, the metal powder may be selected from gold (Au), silver (Ag), aluminum (Al), copper (Cu) and nickel (Ni) powders. On the other hand, the insulator powder may be selected from aluminum nitride (AlN), alumina (Al_2O_3) and boron nitride (BN) powders. The filler is added to increase the thermal resistance, but the insulative characteristic must be maintained. For this reason, the resistance of the filler material should be greater than 10^{10} Ohms, and more desirably, greater than 10^{12} Ohms" (column 3, line 64 through column 4, line 9)

In Claim 3, Sono states:

"3. The semiconductor device as claimed in claim 1, wherein said second resin has a resistance of at least 10^{10} Ohms."

Applicant notes that Sono appears to state the requirement that the fin structure 12 maintain an insulating characteristic in two ways. First, in the Specification, the filler material is described as having a resistance of greater than 10^{10} Ohms. Second, in Claim 3 the second resin is specified as having a resistance of at least 10^{10} Ohms. It appears that Sono is teaching that the composite second resin, that is used to form the radiating fin structure, is formed so as to exhibit a high electrical resistance of over 10^{10} Ohms.

Based on the above analysis, Applicant notes two very important differences between the teachings of Sono and those of Applicant's claimed invention as recited in now Amended independent Claims 1, 15, 31, and 41. First, Sono teaches forming the radiating fin structure with a high resistance level (greater than 10^{10} Ohms). Second, Sono teaches a filler of metal powder and insulator powder (metal nitride or metal oxide). By comparison, Applicant's claimed invention teaches a highly conductive material that is formed by a combination of micron conductive fiber and base resin. For example, Amended Claim states:

1. (Currently Amended) A heat sink device comprising:

a bulk region;

an attachment surface on a first side of said bulk region; and

a convection surface on a second side of said bulk region wherein said bulk region, attachment surface, and convection surface comprise a conductive loaded, resin-based material comprising micron conductive fiber ~~conductive materials~~ in a base resin host and wherein said conductive loaded resin-based material is highly conductive.

Claims 15, 31, and 41 have been similarly amended. These amendments are consistent with embodiments of the present invention disclosed in the original specification. For example, in the original specification, on page 19-20, states:

> "As previously mentioned, the conductive loaded resin-based materials have a resistivity between about 5 and 25 ohms per square, other resistivities can be achieved by varying the doping parameters and/or resin selection. To realize this resistivity the ratio of the weight of the conductor material, in this example the conductor particles 34 or conductor fibers 38, to the weight of the base resin host 30 is between about 0.20 and 0.40, and is preferably about 0.30.

Stainless Steel Fiber of 8-11 micron in diameter and lengths of 4-6 mm with a fiber weight to base resin weight ratio of 0.30 will produce a very highly conductive parameter, efficient within any EMF spectrum."

Applicant believes that embodiments of the present invention teach two features not taught by Sono. In particular, (1) micron conductive fiber is used as the conductive loading, with or without additional conductive loading of conductive powder, and (2) the heat dissipating device is highly conductive. These features do not appear to be anticipated by Sono. Sono no where teaches or suggests the use of fiber. Therefore, Applicant believes that independent Claims 1, 15, 31, and 41 are not anticipated by Sono and respectfully requests that these claims not be rejected under 35 USC 102(b). In addition, Claims 3-5, 7, 9, 32, 35, and 43 depend from Claims 1, 15, 31, and 41 and represent patentably distinct further limitation on these independent claims that do appear to be anticipated by Sono based on the above discussion.

Reconsideration of Claims 1, 3-5, 7, 9, 31, 32, 35, 41, and 43, rejected under 35 USC 102(b) as being anticipated by Sono et

al is requested based on Amended Claims 1, 7, 9, 31, 35, 41, and 43, and the above remarks.

Reconsideration of Claims 2, 6, 8, 10-13, 36, 37, 39, 42, 44, and 45, rejected under 35 USC 103 (a) as being unpatentable over Sono et al is requested based on Amended Claims 2, 11-13, 36, 42, and 44, on Canceled Claims 10, 37, and 45, and the following remarks.

As described above, Applicant believes that the teachings of Sono differ substantially from those of Applicant's claimed invention. Applicant has carefully reviewed the teachings of Sono and does not find a teaching or a suggestion of using micron conductive fiber or of forming a heat dissipating structure having a high conductivity. These features are clearly taught in Applicant's claimed invention as recited in now Amended, independent Claims 1, 15, 31, and 41. Of particular importance is the fact that Sono teaches a high resistance radiating fin structure as described above. It appears that the Applicant has selected different materials from those taught by Sono (micron conductive fiber vs. metal and metal oxide powder) to thereby achieve a different outcome than taught by Sono (high conductivity vs. high resistance). Applicant's claimed invention does not appear to be an obvious extension of the

cited art. Rather, Applicant has a non-obvious invention that produces different results. Therefore, Applicant respectfully requests that these claims not be rejected under 35 USC 103(a) as unpatentable over Sono et al. Further, Claims 2, 6, 8, 11-13, 36, 39, 42, and 44 represent patentably distinct, further limitations on base Claims 1, 15, 31, or 41, that appear to be patentable over Sono based on the above remarks.

Reconsideration of Claims 2, 6, 8, 10-13, 36, 37, 39, 42, 44, and 45, rejected under 35 USC 103 (a) as being unpatentable over Sono et al is requested based on Amended Claims 2, 11-13, 36, 42, and 44, on Canceled Claims 10, 37, and 45, and the above remarks.

Reconsideration of Claims 14, 38, and 46 rejected under 35 USC 103 (a) as being unpatentable over Sono et al in view of Feinberg et al is requested based on Amended Claims 14, 38, and 46, and the following remarks.

Applicant has carefully reviewed the teachings of Feinberg. Feinberg appears to teach two types of metal overlays. In one embodiment (Fig. 1), a metal top shield 14 is first formed and then filled with a silicone-based material 10. The metal top shield 14 comprises copper or nickel. (col. 2, line 64 - col. 3,

line 5) Since this metal top shield 14 is first formed as a stand-alone object, it appears to the Applicant that it cannot be referred to as a coating or as metal plating formed onto the silicon gel pad 10. Fig. 2 describes a similar embodiment or a metal shield 34. Fig. 3 describes a different type of shield embodiment. In this case a copper foil 58 is placed over the silicon pad 54 (col. 4, lines 20-28). Applicant understands that such a system would require forming the pad 54 and the foil 58 separately and then assembling the foil over the pad as it appears to be described in the text. Again, this appears very different from the formation of metal coating of metal plating onto a preformed heat dissipating device.

Applicant has amended Claims 13, 14, 27, 28, 36, 38, 44, 46, and 61 to make clear the distinctive features of Applicant's claimed invention. For example, Claims 13 and 14 now read:

13. (Currently Amended) The device according to Claim 1 further comprising a metal layer coated onto said conductive loaded resin-based material. ~~wherein said conductive materials comprise a combination of conductive powder and conductive fiber.~~

14. (Currently Amended) The device according to Claim 1 further comprising a metal layer plated onto said conductive loaded resin-based material. ~~overlying a part of said device.~~

The other referenced Amended Claims have been similarly amended. Applicant believes that these amendments should clearly distinguish and define Applicant's invention in light of the cited art. Applicant's specification teaches:

> "The metal layer 72 may be formed by plating or by coating." (page 22)

As described above, Applicant believes that the teachings of Sono differ substantially from those of Applicant's claimed invention. Applicant has carefully reviewed the teachings of Sono and of Feinberg and does not find a teaching or a suggestion of using micron conductive fiber to form a heat dissipating structure having a high conductivity. These features are clearly taught in Applicant's claimed invention as recited in now Amended, independent Claims 1, 15, 31, and 41. Of particular importance is the fact that Sono teaches a high resistance radiating fin structure as described above. It appears that the Applicant has selected different materials from

those taught by Sono (micron conductive fiber vs. metal and metal oxide powder) to thereby achieve a different outcome than taught by Sono (high conductivity vs. high resistance). Applicant's claimed invention does not appear to be an obvious extension of the cited art. Rather, Applicant has a non-obvious invention that produces different results. Therefore, Applicant respectfully requests that Claims 14, 38, and 46 not be rejected under 35 USC 103(a) as unpatentable over Sono et al in view of Feinberg.

Reconsideration of Claims 14, 38, and 46 rejected under 35 USC 103 (a) as being unpatentable over Sono et al in view of Feinberg et al is requested based on Amended Claims 14, 38, and 46, and the above remarks.

Reconsideration of Claims 15-27, 29, 30, 33, 34, and 40 rejected under 35 USC 103 (a) as being unpatentable over Sono et al in view of Yamamoto et al is requested based on the Amended Claims 15-16, 18, 21, 23, and 25-27, on Canceled Claims 24 and 34, and the following remarks.

Applicant has carefully reviewed the teachings of Yamamoto and finds that Yamamoto teaches heat pipes of all metal (aluminum and copper) construction with internal mesh materials

of various types. Yamamoto does not teach or suggest any heat pipe formed of a conductive loaded resin-based material as taught in Applicant' claimed invention. Applicant has amended independent Claims 15 and 31 to specify the embodiment of a heat pipe formed of conductive loaded resin-based material where micron conductive fiber is used as the loading material. Amended Claims 15 and 31 are shown below:

15.(Currently Amended) A heat pipe device comprising:

a conduit comprising a conductive loaded, resin-based material comprising micron conductive fiber ~~conductive materials~~ in a resin host; and

a vaporizable liquid sealed inside said conduit.

31. (Currently Amended) An electrical system device comprising:

an electrically powered device; and

a thermal dissipation device comprising a conductive loaded, resin-based material comprising material comprising micron conductive fiber ~~conductive materials~~ in a base resin host wherein said conductive loaded resin-based material is highly conductive.

As described above, Applicant believes that the teachings of Sono differ substantially from those of Applicant's claimed invention. Applicant has carefully reviewed the teachings of Sono and of Yamamoto and does not find a teaching or a suggestion of using micron conductive fiber to form a heat dissipating structure having a high conductivity. These features are clearly taught in Applicant's claimed invention as recited in now Amended, independent Claims 15 and 31. Of particular importance is the fact that Sono teaches a high resistance radiating fin structure as described above. It appears that the Applicant has selected different materials from those taught by Sono (micron conductive fiber vs. metal and metal oxide powder) to thereby achieve a different outcome than taught by Sono (high conductivity vs. high resistance). Applicant's claimed invention does not appear to be an obvious extension of the cited art. Rather, Applicant has a non-obvious invention that produces different results. Therefore, Applicant respectfully requests that Claims 15 and 31 not be rejected under 35 USC 103(a) as unpatentable over Sono et al in view of Yamamoto. Further, Claims 16-23, 25-27, 29, 30, 33, and 40 represent patentably distinct, further limitations on base Claims 15 or 31 that appear to be patentable over Sono in view of Yamamoto based on the above remarks.

Reconsideration of Claims 15-27, 29, 30, 33, 34, and 40 rejected under 35 USC 103 (a) as being unpatentable over Sono et al in view of Yamamoto et al is requested based on the Amended Claims 15-16, 18, 21, 23, and 25-27, on Canceled Claims 24 and 34, and the above remarks.

Reconsideration of Claim 28 rejected under 35 USC 103 (a) as being unpatentable over Sono et al in view of Yamamoto et al and further in view of Feinberg et al is requested based on the Amended Claim 28 and the following remarks.

Applicant has amended Claim 28 to specify that the metal layer is plated onto the conductive loaded resin-based material as is shown by:

> 28. (Currently Amended) The device according to Claim 15 further comprising a metal layer plated onto said conductive loaded resin-based material. ~~overlying a part of said device.~~

As described above, Applicant can find no teaching or suggesting in Feinberg to form a metal layer on the conductive loaded resin-based material via coating or plating. In addition, Sono and Yamamoto do not teach or suggest the formation of a

metal layer on the conductive loaded resin-based material via coating or plating.

As described above, Applicant believes that the teachings of Sono differ substantially from those of Applicant's claimed invention. Applicant has carefully reviewed the teachings of Sono, Yamamoto, and Feinberg and does not find a teaching or a suggestion of using micron conductive fiber to form a heat dissipating structure having a high conductivity. These features are clearly taught in Applicant's claimed invention as recited in Amended Claim 28. Of particular importance is the fact that Sono teaches a high resistance radiating fin structure as described above. It appears that the Applicant has selected different materials from those taught by Sono (micron conductive fiber vs. metal and metal oxide powder) to thereby achieve a different outcome than taught by Sono (high conductivity vs. high resistance). Applicant's claimed invention does not appear to be an obvious extension of the cited art. Rather, Applicant has a non-obvious invention that produces different results. Therefore, Applicant respectfully requests that Claim 28 not be rejected under 35 USC 103(a) as unpatentable over Sono et al in view of Yamamoto and further in view of Feinberg et al.

Reconsideration of Claim 28 rejected under 35 USC 103 (a) as being unpatentable over Sono et al in view of Yamamoto et al and further in view of Feinberg et al is requested based on the Amended Claim 28 and the above remarks.

Reconsideration of Claims 52-64 rejected under 35 USC 103 (a) as being unpatentable over Moore in view of Sono et al is requested based on the Amended Claims 52, 54, 55, 58, 60, and 61, Canceled Claim 64, and the following remarks.

Applicant has carefully reviewed the teachings of Moore. Moore appears to teach, as in for example Fig.1, a tungsten halogen lamp assembly 22 held in an aluminum heat sink 34. A flexible silicon rubber adhesive 30 is disposed between the lamp 22 and heat sink 34. This adhesive 30 comprises silicon rubber containing metal, ceramic, or mineral powder (col. 4, lines 22-60 and col. 3, lines 3-5, and col. 6, lines 7-10). It does not appear that Moore teaches or suggests that the radiating heat sink 34, itself, should be formed of a conductive loaded resin-based material as taught in Applicant's claimed invention. Therefore, it does not appear that Moore provides any additional disclosure to improve on what is taught in Sono. As described above, Applicant believes that the teachings of Sono differ substantially from those of Applicant's claimed invention.

Applicant has carefully reviewed the teachings of both Moore and Sono and does not find a teaching or a suggestion of using micron conductive fiber to form a heat dissipating structure having a high conductivity. These features are clearly taught in Applicant's claimed invention as recited in Claims 52-63. Of particular importance is the fact that Sono teaches a high resistance radiating fin structure as described above. It appears that the Applicant has selected different materials from those taught by Sono (micron conductive fiber vs. metal and metal oxide powder) to thereby achieve a different outcome than taught by Sono (high conductivity vs. high resistance). Applicant's claimed invention does not appear to be an obvious extension of the cited art. Rather, Applicant has a non-obvious invention that produces different results. Therefore, Applicant respectfully requests that Claims 52-63 not be rejected under 35 USC 103(a) as unpatentable over Moore in view of Sono et al.

Reconsideration of Claims 52-64 rejected under 35 USC 103 (a) as being unpatentable over Moore in view of Sono et al is requested based on the Amended Claims 52, 54, 55, 58, 60, and 61, Canceled Claim 64, and the above remarks.

All Claims are believed to be in condition for Allowance, and that is so requested.

Applicants have reviewed the prior art made of record and not relied upon and have discussed their impact on the present invention above.

Allowance of all Claims is requested.

It is requested that should the Examiner not find that the Claims are now Allowable that the Examiner call the undersigned at 989-894-4392 to overcome any problems preventing allowance.

Respectfully submitted,

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